PHONETICAL NOTES.

IT is my intention to publish, under the above title, a series of minor studies in phonetics. The investigations have been carried on with the aid of the apparatus used by Rousselot, and described by him in the *Revue des Patois gallo-romans*, fasc. 14, 15. A short account can also be found in an article by Professor Koschwitz, *Herrig's Archiv*, vol. 88, p. 241 ff., and, in a very condensed form, in the abstract of a paper read by the writer before the American Philological Association in 1895 (cf. *Proceedings*, 1895, p. 55). Cf., also, *Phonetische Studien*, vol. 4, p. 68, for an article by Ph. Wagner.

In order to give the reader a better insight into the method employed, the first articles will be accompanied by illustrations reproduced from the material collected. It is hoped that this may assist phoneticians and philologists in becoming acquainted with a method of research that is gradually gaining recognition, and that after the many desirable improvements shall have been perfected, will enable us to solve the numerous unanswered problems of physiological phonetics, and establish incontrovertible facts that leave no room for speculation.

I.

On *r*-Vibrations.

A rolled *r* sound can be produced by vibrations of the lips, the tongue, the uvula, or the vocal cords. The following statistics try to answer the question as to the frequency of the *r*-waves within a given period. As far as I know only Vietor and Donders have investigated this point with regard to the lingual *r*; both arrive at similar conclusions. Vietor

finds 20 to 35 vibrations within a second, Donders varies between 15 and 39; cf. Vietor, *Elemente der Phonetik*, dritte verb. Auflage, p. 208. To determine whether his ratio is individual I have supplemented my own records by a large number of tracings gathered during a tour in Northeastern Europe. Professors Lundell, Noreen, Johansson, and Drs. Wadstein, Krohn, Pipping, Masing, Mikkola, and Mr. Endsilin, of Dorpat, have been kind enough to record their pronunciation. The following are the values found:[1]

A. lip *r*, sonant: 32, 30 (P.); 22, 24; 23, 25, 23 (S-W.); 27, 29, 27, 26, 25½, 25½, 23 (Mi.).

surd: 26, 33, 34 (P.).

B. lingual *r*, sonant: 32; 27, 28; 30, 30, 32, 27, 25; 28, 29, 30; 28, 30½; 21, 21½, 29, 28; 27 (S-W.). 28, 29 (P.); 27, 27 (N.); 29 (J.); 24, 23 (W.); 26, 25, 24, 27 (Mi.). 29, 31, 29, 30 (K.).

deep sonant: 26, 29 (S-W.); 29 (E.).

high sonant: 27, 26 (S-W.); 24, 26 (P.).

still higher sonant: 25, 24; 25, 24; 27, 25 (E.). 25½, 25; 20, 22 (S-W.); 26, 25 (Mi.).

strong, emphatic: 30, 28, 30 (P.); 28, 26½ (S-W.); 32, 32 (Mi.). 31, 34, 36 (Mi.).

Armenian rolled *r*: 20, 19½ (Ma.).

surd: 33, 31; 33, 31, 31; 37, 35½ (S-W.); 38 (P.); 26, 26 (N.); 25 (J.).

strong surd: 38, 42, 39; 39, 40, 41 (S-W.).

The above values show that the individual differences are not considerable. The surd *r*, as well as the sonant one pronounced with a deep tone-color, slightly increase the number of vibrations as the air current is strengthened; the high tone-color, with narrowed glottis, is naturally accompanied by less vibrations. Likewise, at the beginning of a continuous pronunciation the number of beats is somewhat larger than towards the end, unless an attempt is made to keep up the force of expiration, in which effort the voice is occasionally suppressed. The tracings do not always show marks of this loss of sonancy.

[1] Numbers separated by commas refer to values of one continued record.

Below are some illustrations of lingual *r* curves.

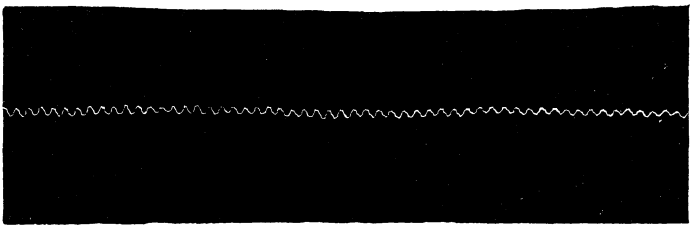

PLATE 1. — Sonant lingual *r*; vel. 4.6 cm. per second.

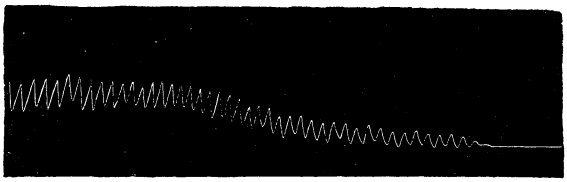

PLATE 2. — Sonant *r* becoming surd; vel 4.6 cm. per second.

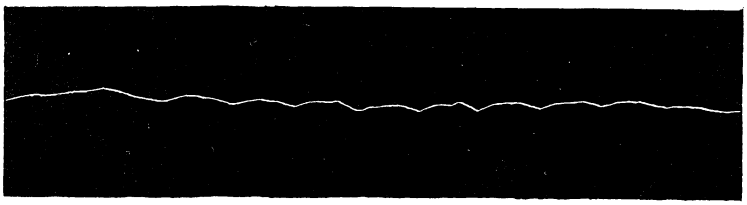

PLATE 3. — Sonant lingual *r*; vel. 26.6 cm. per second.

C. guttural *r*, sonant: 26 (S-W.); 24, 24, 25, 24 (pronunc. of a lady); 20 (P.); 20 (S-W.).

surd: 29; 32, 34, 32; 36, 35 (S-W.).

The results are interesting: the tongue and uvula vibrate with nearly equal rapidity. This fact speaks in support of Jesperson's theory concerning the origin of the uvular *r*; cf. *The Articulations of Speech Sounds represented by Means of Analphabetic Symbols*, Marburg, 1889, p. 72 ff.

The lack of more material for the uvular *r* is partly due to the fact that not many persons are able to produce continuous uvular vibrations, even in cases where the other variety is not known. Here, as also with the lingual *r*, the rolled quality is sufficiently perceptible, and the *r* characterized as such, by

one to three vibrations — the rest is either a deep guttural spirant or, if lingual, a vocalic element. The following tracings are self-explanatory.

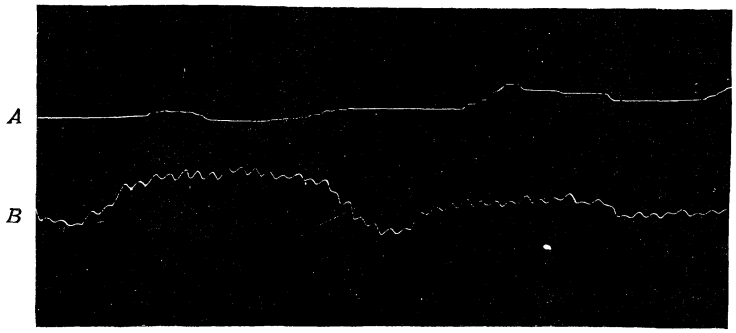

PLATE 4. — Guttural *r*; *A*, interrupted by spirant; *B*, voiced, trilled; vel. 4.6 cm. per second.

The glottal *r*, as pronounced, for instance, in Copenhagen, I have not had an opportunity to investigate.

II.

The Quantity of Labials in Finnic Swedish.

Speech mixture exhibits an interesting phenomenon: the influence of two or more languages or dialects on one another with regard to the different factors that constitute articulate speech — quality of sounds, accent, quantity, and syntax. Some material obtained during a short stay at Helsingfors is herewith submitted.

Geminated consonants are pronounced markedly long in Swedish; their quantity is said to have been affected by the non-Aryan speech in Finland. Because of the simplicity of the instruments required for the investigation of labials — Rosapelly's lip observer — these sounds were chosen. The tracings from which the values are derived were furnished by Dr. Mikkola (Finnic), and Dr. Pipping (Swedish, Finland).

-mm-; sammui, "extinguished" (cf. pl. 5).
α) 0.14; β) 0.175.[1]

[1] The values denote quantities expressed in seconds. Records pronounced in continuation are collected under α, β, or γ.

ämmä, "old woman":

α) 0.13; β) very short, though impossible to express by a definite value.

-m-; loma, "interval":	α) 0.09;	β) 0.08.				
aamu, "morning":	α) 0.095;	β) 0.14.				
-pp-: appi, "father-in-law":	α) 0.26;	β) 0.25;	γ) 0.15.			
oppi, "doctrine":	α) 0.2;	β) 0.3;	γ) 0.12.			
-p-; lupa, "permission":	α) 0.15;	β) 0.075;	γ) 0.075.			
apu, "help":	α) 0.08;	β) 0.06;	γ) 0.075.			
papu "pea":	α) 0.07;	β) 0.07;	γ) 0.075.			

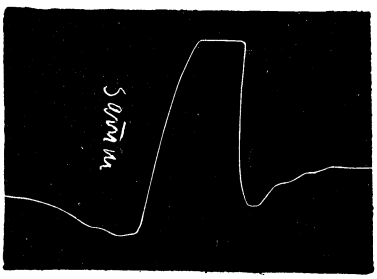

PLATE 5. — "sammui." The horizontal line indicates the quantity of the *m* closure; vel. 4.6 cm. per second.

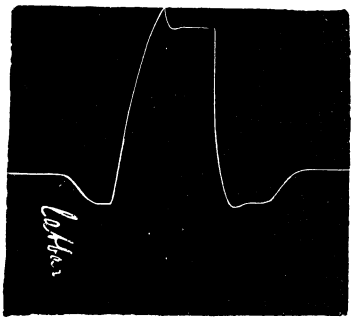

PLATE 6. — "labbar (Dr. Mikkola); vel. 4.6 cm. per second.

Swedish pronunciation as given by Dr. Mikkola:

1.	*-pp-*;	pappa,	"father":	0.21.
2.	*-pp*;	lapp,	"rag":	0.32.
3.	*-p-*;	apa,	"ape":	0.2.
4.	*-p*;	gap,	"throat":	0.17.
5.	*-bb-*;	labbar,	"fists":	0.18 (cf. pl. 6).
6.	*-bb*;	labb,	"fist":	0.15.
7.	*-b-*;	snabel,	"bill":	0.08.
8.	*-mm-*;	mamma,	"mother":	0.29.

The values obtained from Dr. Pipping's pronunciation are:

1. 0.18; 0.35 (!).
2. 0.25.
3. 0.16.
4. 0.25.
5. 0.15; 0.22 (cf. pl. 7).
6. 0.19; 0.23.
7. 0.1; 0.1; 0.09; 0.1.
8. 0.24; 0.16; 0.22; 0.225.

Professor Lundell's (Upsala) labials show the following values:

1. 0.375 ; 0.36 ; 0.34.
2. 0.375 ; 0.39 ; 0.48.
3. 0.275 ; 0.25 ; 0.24.
4. — — —
5. 0.3 (cf. pl. 8) : 0.23.
6. 0.25 ; 0.23.
7. — — —
8. 0.25 ; 0.24 ; 0.25.

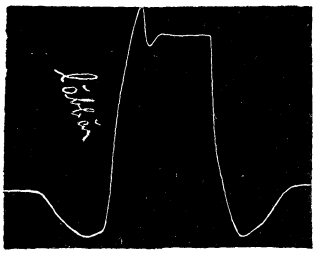

PLATE 7. — "labbar" (Dr. Pipping); vel. 4.6 cm. per second.

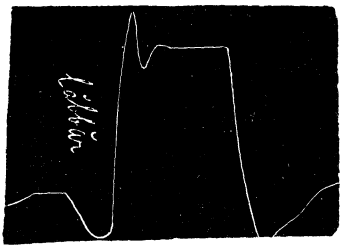

PLATE 8. — "labbar" (Prof. Lundell); vel. 4.6 cm. per second.

Further material would enable us to make nicer distinctions as to position of accent and quantity of the preceding vowel. The results that we can draw from the values presented may be shortly formulated as follows: In Finnic the labial closures are very short; single labials are distinguished from double ones by quantity, ratio about 1 : 2. In the Swedish spoken in Finland the geminated labials approach the Finnic absolute quantities.

It will also be noticed that the "einsatz" is much more rapid and energetic in Swedish than in Finnic. The almost straight line, and the greater momentum, carrying the style beyond its point of rest (cf. pl. 8), are very instructive.

We may *a priori* suppose that this holds good also with regard to other consonants. Yet only a special investigation can decide this question.

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